

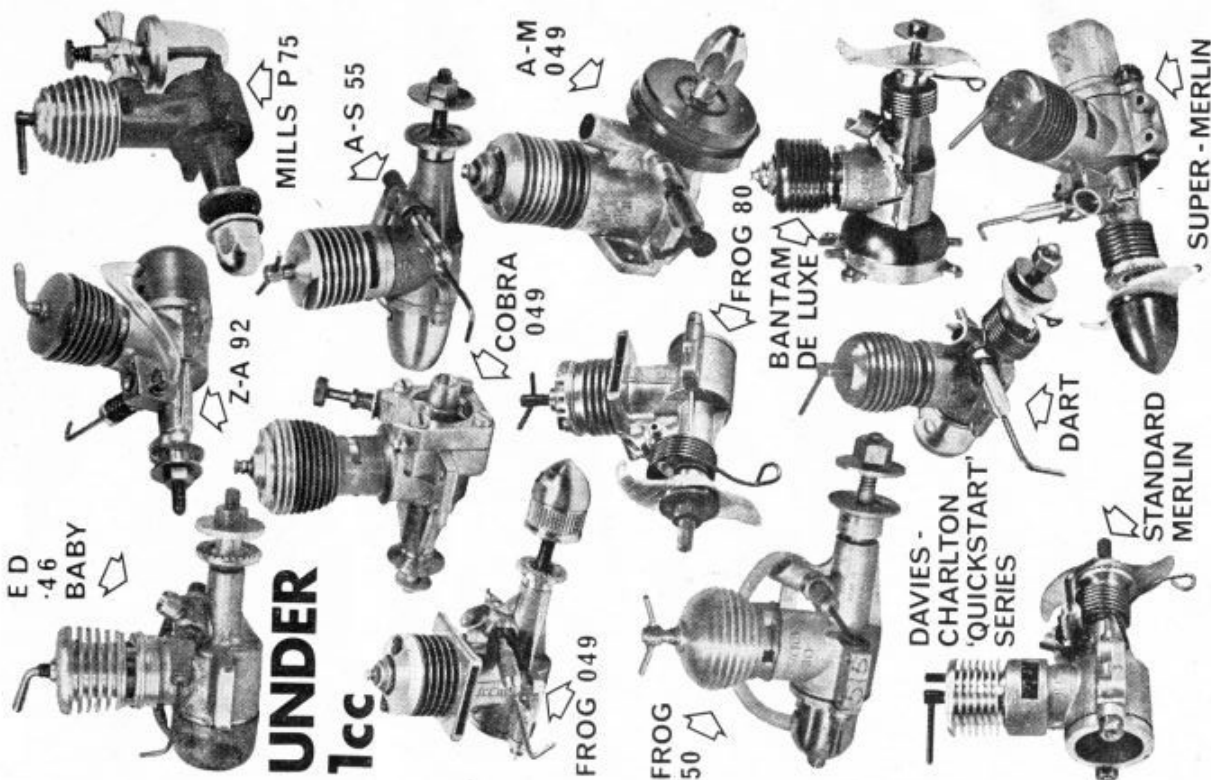
# CHOOSING YOUR ENGINE

A SURVEY OF OVER 50  
CURRENT PRODUCTION  
AND POPULAR BRITISH  
MODEL AIRCRAFT ENGINES

## 1965 PRODUCTION SUMMARY

A complete listing of British engines in current production with pertinent facts and prices. Basic price is for the benefit of overseas readers who are not liable to Purchase Tax. "D" means Diesel, "G" means Glow-plug

Engine	Ignition	Displacement c.c.	Displacement cu. ins.	Cylinder Bore	Stroke	Weight (oz.)	May 1965 basic price	British price with p.t.
<b>A-M</b>								
10	D	1.00	.061	.462	.430	3.0	51/6d	60/10d
10 R/C	D	1.00	.061	.462	.430	3.25	52/6d	74/10d
15	D	1.48	.09	.517	.430	3.00	53/4d	62/10d
15 R/C	D	1.48	.09	.517	.430	3.25	64/2d	73/8d
25	D	2.4	.147	.57	.562	4.00	60/0d	70/0d
35	D	3.42	.209	.687	.562	4.5	61/8d	74/8d
<b>E.D.</b>								
Cadet	D	.98	.061	.437	.400	3.9	24/6d	29/6d
Hawk	D	1.48	.093	.513	.452	3.3	24/6d	29/6d
2-46 Racer	D	2.46	.15	.59	.55	5.4	70/5d	85/0d
2-46 Racer (tuned)	D	2.46	.15	.59	.55	5.4	89/1d	107/6d
2-46 Racer R/C	D	2.46	.15	.59	.55	6.00	89/1d	107/6d
<b>ETA</b>								
15 Mk III	D	2.48	.15	.558	.620	6.25	125/0d	148/6d
29 Mk Vic	G	4.95	.30	.750	.672	6.5	129/6d	153/10d
<b>FROG</b>								
80 Mk III	D	.80	.049	.400	.392	1.9	46/3d	54/3d
100 Mk III	D	1.02	.062	.416	.460	3.00	48/3d	57/0d
150 Mk III	D	1.49	.091	.500	.460	3.25	50/4d	59/6d
249 BB	D	2.49	.151	.580	.568	6.0	67/4d	79/6d
349 BB	D	3.49	.208	.666	.600	6.7	74/4d	87/6d
349 BB R/C	D	3.49	.208	.666	.600	6.7	88/6d	105/0d
<b>MAROWN</b>								
M.E. Heron	D	.97	.06	.424	.420	2.4	50/10d	60/6d
M.E. Snipe	D	1.48	.09	.505	.455	4.1	56/3d	67/0d
M.E. Snipe R/C	D	1.48	.09	.505	.455	4.25	64/4d	76/6d
<b>MERCO</b>								
.29	G	4.75	.29	.734	.703	7.5	101/3d	119/6d
.29 R/C	G	4.75	.29	.734	.703	8.25	129/0d	152/6d
.35	G	5.79	.35	.800	.703	7.5	101/3d	119/6d
.35 R/C	G	5.79	.35	.800	.703	8.25	129/0d	152/6d
.49	G	8.00	.49	.880	.805	12.5	169/0d	199/6d
.49 R/C	G	8.00	.49	.880	.805	13.00	200/0d	236/8d
.61 R/C	G	10.00	.61	.938	.875	13.00	217/6d	256/9d
<b>P.A.W.</b>								
1.49	D	1.48	.09	.494	.469	3.5	72/10d	86/0d
2.49 Mk III	D	2.49	.151	.592	.532	5.00	83/0d	98/0d
19 D Mk II	D	3.128	.1912	.642	.590	5.5	88/6d	104/6d
19-BR	D	3.128	.1912	.642	.590	6.0	106/9d	126/0d
<b>TAPLIN</b>								
Twin Mk II	D	8.00	.49	.705	.625	17.00	158/4d	190/0d
<b>OLIVER</b>								
Tiger Cub Mk II/S	D	1.46	.089	.470	.523	4.13	108/4d	130/0d
Tiger Cub Mk II (sports)	D	1.46	.089	.470	.523	4.13	125/0d	150/0d
Tiger Mk III/S	D	2.424	.148	.551	.620	5.5	115/10d	139/0d
Tiger Mk III (sports)	D	2.424	.148	.551	.620	5.5	132/6d	152/6d
Tiger Mk III R/C	D	2.424	.148	.551	.620	5.5	145/10d	175/0d
Tiger Major/S	D	3.47	.212	.620	.705	6.00	129/2d	155/0d
Tiger Major (sports)	D	3.47	.212	.620	.705	6.00	145/10d	175/0d
Tiger Major R/C	D	3.47	.212	.620	.705	6.00	160/5d	192/6d
<b>D.C. Quickstart</b>								
Dart	D	.55	.036	.35	.35	1.25	63/8d	75/0d
Bantam	G	.76	.047	.410	.352	1.5	38/3d	45/0d
Bantam de luxe	G	.76	.047	.410	.352	1.5	49/4d	58/0d
Merlin	D	.76	.047	.375	.420	1.75	50/7d	59/6d
Super Merlin	D	.76	.047	.375	.420	1.8	55/3d	65/6d
Spiffire	D	.57	.039	.425	.420	3.00	54/4d	71/0d
Sabre	D	1.49	.091	.525	.420	3.00	63/8d	75/0d

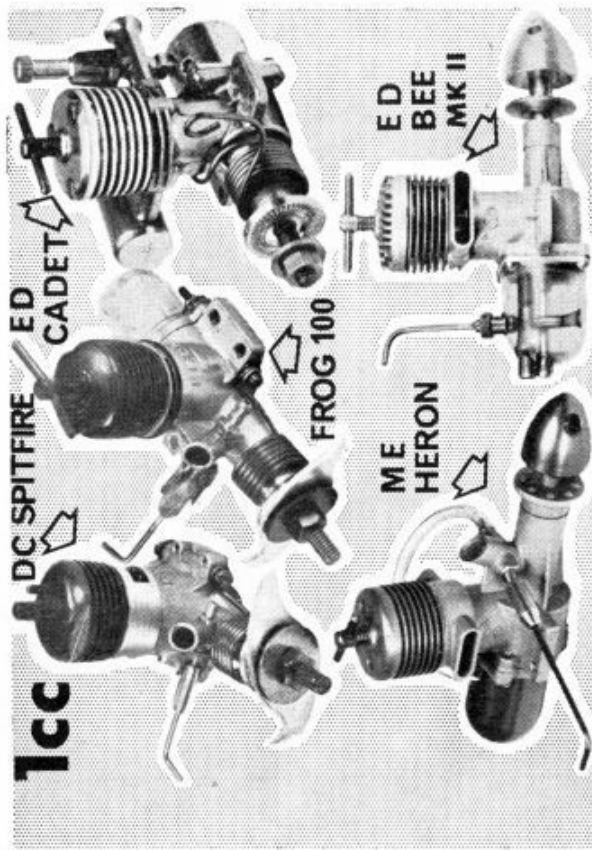
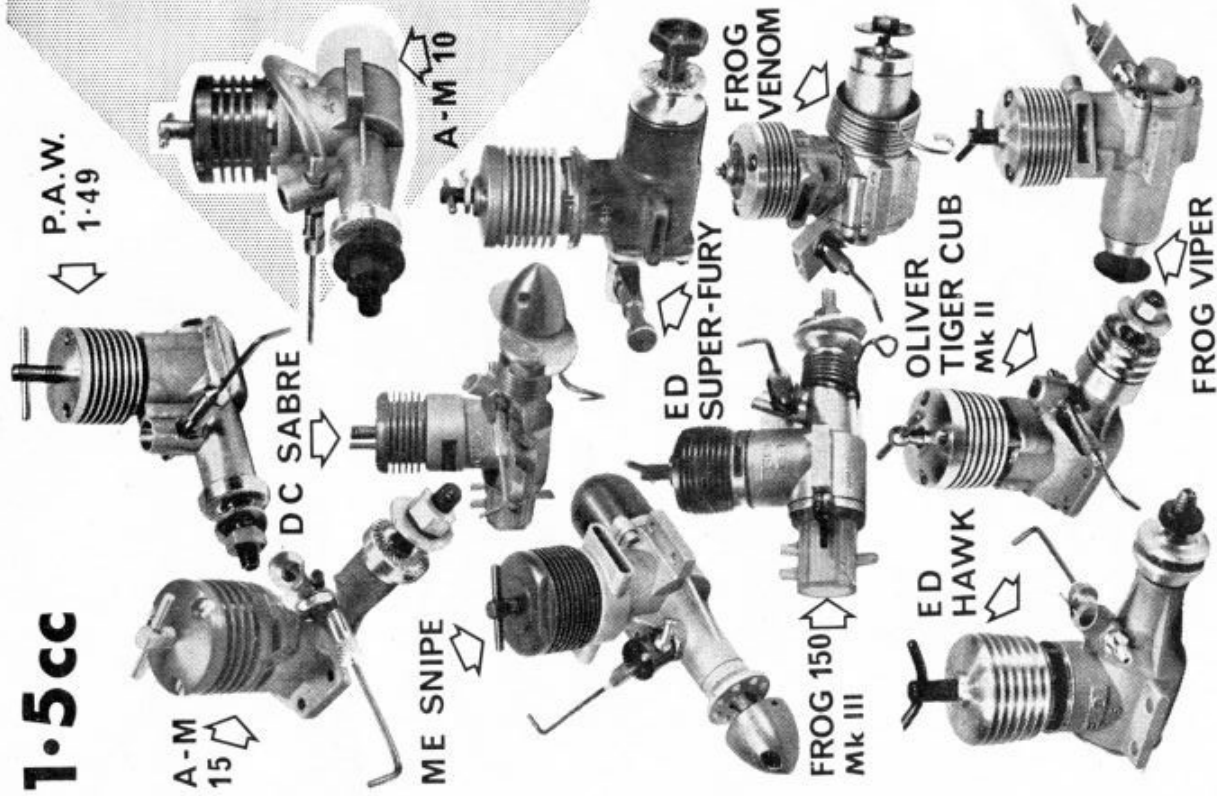


## From the smallest . . .

*This survey of current production and recent British engines is offered as a buying and identity guide*

Made under licence from **Wen Mac** the **A.M. .049** glow engine is no longer in production. This was the first British engine to have a fully enclosed starter called "Rotomatic" in the U.S.A. Front rotary induction with a plain bearing shaft and integral air intake made this a very light weight engine. For beam or radial mounting the lugs were slotted and not drilled as in the normal manner. Space bearers 3/4 in. apart. Sadly the **AS. 55** also went out of production. This was a pity as it was a really nice easy starting and smooth running little engine. Bearers are spaced 1 1/16 in. apart for beam mounting. A lively little engine is the red headed **D.C. Quickstart Dart .5 c.c.** diesel. It was one of the first "performance" front rotary induction miniature engines with the air intake cast into the crankcase and now has a coil spring and cam rewind starter with a transparent fuel tank as standard items. Beam mount only with bearers spaced 1 1/16 in. apart. The **D.C. Quickstart Merlin** comes in both standard and de luxe versions (called the **Super Merlin**) the extras including a rear bolt-on transparent fuel tank and a red spinner nut and cylinder, front rotary shaft induction via integral air intake. They are easy starters, cheap to run and can be fitted by radial or beam mounting with bearers spaced 15/16 in. apart. The **D.C. Quickstart Bantam** is also produced as a de luxe version, this including radial mounting rear tank as an extra. It has front rotary shaft induction with the air intake cast into the crankcase. Beam mounting can be used with bearers spaced 1 1/16 in. apart. Out of production but still widely used, the **E.D. .46 Baby** is known for its docile handling and ability to run on practically any sort of fuel. Beam mount with the bearers spaced 3/4 in. apart. Also no longer in production the **Frog 50** diesel was another with front rotary shaft induction and a turned metal tank. With a screw-in cylinder liner and head it proved very popular for small F/F models of up to 35 in. span. Beam mount only bearers spaced 5/8 in. apart. The current production **Frog 80** incorporates a coil spring cam starter and can be used for all sport models. With a deeply finned steel cylinder, large but shallow exhaust stacks and built in nylon compression screw lock, it has much to commend it. Having front rotary shaft induction with integral air intake it is suited to 30 - 44 in. F/F or 30 in. R/C and 12-25 in. C/Liners. A glow plug version known as the **Frog .049** was once produced with an unfinned head and knurled spinner nut for pulley starting. Beam mount only on bearers spaced 1 1/16 in. apart. The **Mills .75** must surely enjoy a hallowed place in many modellers' hearts for its ability to run for many years without needing any attention, easy starting and logging power on large props. With side port induction that has the air intake screwed to the rear of the cylinder and a suspended clear plastic fuel tank it is easily distinguishable with its black crackle finish crankcase and small diameter shaft housing. Beam mount only with the bearers spaced 5/8 in. apart. Regrettably the **Mills .75** is no longer produced. Also out of production the **Keil Kraft Cobra .049** was a rear reed valve induction glow plug engine with a neat rear mounted needle valve. Beam mount on bearers spaced 3/4 in. apart. Alphabetically last of the small capacity group is the **Z.A. .92** a zippy little engine that starts and runs well. It went out of production only recently. Front rotary induction is arranged via an integral air intake that forms a square block in front of the cylinder. Beam mount only with bearers spaced 13/16 in. apart. All the engines in this group should use 1/4 in. x 3/8 in. hardwood bearers for beam mounting.

# 1.5cc



## ... the popular 1 cc to 1.5 cc

The **A.M. 10** is a universal purpose engine and was exceptional for its specific power output when introduced in 1956. Green anodising on the cylinder head distinguishes it from the blue headed A.M. 15, each sharing the same front rotary shaft induction via an integral cast intake in crank case, also the same rear bolt-on nylon tank. A radio control version with a simple rotating barrel throttle is available at 12/5d. above the basic cost and with slight increase in weight. The A.M. 10 will slog at 6,000 or equally happily at 14,000 r.p.m. Developed over many years the **D.C. Quickstart Spitfire** is a very docile sports and beginners engine. Featuring a coil spring and cam recoil starter, with a blue cylinder head (it was once red) and transparent fuel tank bolted onto the mounting lugs it is robust and prang proof. A screw-in cylinder head retains the otherwise loose fit cylinder and the needle valve is swept back for greater propeller clearance. Tank mounting bolts can be used if a radial mount is preferred. Although no longer in production the **E.D. Bee** is still a favourite and there are thousands to whom this was a first engine.

Featuring rear disc induction with the air intake running through the tank. **E.D. Cadet** was introduced as a replacement incorporating a coil spring recoil starter and silencer as standard items. The back plate mounted tank is turned from alloy and the rest of the engine is basically similar to the E.D. Bee with modification to side-port induction and solid cylinder head. Starting, with silencer proved to be less predictable. Mounting details are as for the Bee. A most for giving engine for beginners, the **Frog 100 Mk. III** is recognisable by its red cylinder head and spring cam starter. It has front rotary shaft induction (*continued*)



via an intake cast on the crankcase and a transparent fuel tank is bolted to the backplate. The power range extends very usefully over 6-14,000 r.p.m. The **M.E. Heron** has become renowned for a good power output. The crankshaft is exceptionally strong and is unusual in that it has a honed bearing, making for longer life and better running. A raked needle valve is fitted to the intake cast on the crankcase and the Heron comes complete with a spinner nut and metal fuel tank. This is a very easy starting and reliable engine. *These 1 c.c. engines are for beam mounting on 1/4 in. x 3/8 in. hardwood bearers spaced 7/8 in. except the Frog 100 and Quickstart Spitfire which require 15/16 in.*

The **A.M. 15** is a bored out development of the A.M. 10, only external difference being the blue cylinder head. The 15 R/C version is a real slogger on a 9 x 4 propeller and vibration is low despite over-square bore/stroke ratio. Extra cost of the R/C version is 12/7d. for a rotary intake choke type throttle. A red cylinder head is sported by the **D.C. Quickstart Sabre** (it was once green) as well as the coil spring cam starter and fuel tank that can be removed for radial mounting via bolts through the mounting lugs. Again over square this is a good slogging engine that runs most happily at 10-12,000 r.p.m. With a loose fit liner and screw-in head, it has a spinner nut, integrally cast air intake for front rotary shaft induction and compression finding post. No longer in production the **E.D. Super Fury** is a very fast engine suitable for all sport or contest work on small propellers. Shaft is supported in twin ballraces pressed into the crankcase, and induction by rear rotary disc attached to a removable back plate. *These three engines are for beam mounting on 5/16 in. x 7/16 in. bearers spaced 7/8 in. apart.*

Originally a Webra engine with front rotary shaft induction via cast intake and screw-in cylinder liner the **ED. Hawk** runs most happily at 8-10,000 r.p.m. Easy starting and robust construction made this a good first engine. Both of 1.5 c.c. capacity the **Frog Venom** and **Viper** use the same major parts except for the alterations required to make the Venom for Glow Plug ignition and the Viper as a diesel motor. No longer in production they are both unusual with rear drum induction, a twin ballrace supported shaft and rearward slanting exhaust ports cast into the crank case unit. The Venom was equipped with a spring starter. Another unusual recognition feature was the use of deep cooling fins on the bottom of the crankcase. Developed over many years the **Frog 150 Mk. III** has a bright blue cylinder head and front rotary shaft induction via, an intake cast into the crankcase. A coil spring and cam starter is fitted together with a transparent plastic bolt-on fuel tank. Essentially a sport engine we have also seen many perform creditably in 1/2A T/R and speed. *These four engines are beam mounted on hardwood bearers 5/16 in. x 7/16 in. spaced 15/16 in. apart.*

A very "hot" 1.5 c.c. engine is the **P.A.W. 1.49** distinguished by its tall upright air intake situated close to the cylinder head. Front rotary induction and plain bearing shaft of rugged proportions make this engine suitable for all types of flying and contest work, where high revs are desired, space mounts 7/8 in. apart. Last but by no means least of the 1.5 c.c. engines comes the **Oliver Tiger Cub Mk. II** with a twin ballrace supported shaft and front rotary induction, racing porting and performance to match. This engine is the standard for 1/2A T/R flying. Performance out classes some 2.5 c.c. engines. Long life and low fuel consumption make this an outstanding product for which one must pay extra. Beam mount on 3/8 in. x 1/2 in. hardwood bearers spaced 1 in. apart.

## Operating a First Diesel

### Advice on starting and running-in

Ownership of a model engine is practically synonymous with aeromodelling in these affluent days. With this in mind, we intend to run through the process of purchasing and learning how to operate a small diesel. Really, we should be calling our engine "compression ignition" but the name of diesel is so widely used for these miniature two-strokes that it will now continue to be used for ever.

Mention of "two-stroke" recalls the method by which our engine will work. It will fire, or explode a combustible mixture every second stroke. (Unlike a four-stroke, where the firing is every fourth stroke and mechanical valves are employed to control intake and exhaust). The fuel is drawn from the tank, through the carburettor where it mixes with air and into the crankcase via a rear disc, crankshaft or piston controlled valve. The descending piston compresses the mixture in the crankcase, drives it up the transfer passages and through the transfer ports into the upper cylinder. As the rising piston compresses this mixture to the order of 20:1 it is self ignited and combustion gives a power stroke. The piston descends rapidly, and a further charge of mixture comes up from the crankcase to help scavenge the burning gases out through the exhaust. Now all this effort is transmitted through the crankshaft to the propeller, and according to the mixture we give the engine, and the compression ratio we can adjust, so can we vary the power and r.p.m. of our engine. All we have to do is to learn the right way to go about the job.

Mount the engine firmly and fit the propeller on the shaft by slipping it into position, turning the engine until the piston can be moved no further against compression, and tightening the prop nut with the propeller pointing at "twenty to two" as on a clock. Left handed people should treat this as "ten to four". Now swing the propeller over in an anti-clockwise direction. The engine is dry, stiff and there is little "feel" about it. Fill the tank, open the needle valve by unscrewing it the required number of turns from fully closed, and choke the engine. This means placing the spare forefinger over the carburettor and rotating the propeller one turn. Engines with the carburettor in front will indicate that fuel is entering the engine as you observe the flow through the tubing. Should there be a conglomeration of bubbles in the pipeline, then we must choke again to get the line full of fuel. Now try another swing at the propeller. Don't be afraid of it, it certainly will not fire, as all you are doing is filling the crankcase with a mixture, and creating a fine mist of fuel throughout the moving parts. This little amount of lubrication will change the engine from a lifeless object to something with the urge to "go", and as you continue to swing the propeller, you'll find there is an active "plop" as compression drives the propeller over.

Choke again, and repeat the swing at the propeller, only this time putting a real effort into it. Start by putting your forefinger against the top-most blade, about halfway along and push the propeller over compression with a (continued after centre pages)



# 17 Years of Aeromodeler Engine ANALYSES

## PEAK B.H.P. and R.P.M. FIGURES FOR 212 TESTS

1948		1949		1950		1951		1952		1953		1954		1955		1956		1957		1958		1959		1960		1961		1962		1963		1964	
E.D. Comp. Special	May	'K' Vulture 5 cc	January	Albion Dart 1.5 cc	January	Albion Dart 1.5 cc	January	D.C. 350 (G)	January	Motors Micron 28	October	K & B Torpedo 1.5	June	Elfin 1.49 BB	January	Frog 249 BB	January	D.C. 350 (G)	January	Barbini 1 cc	May	Taifun Blizard	January	A.M. -049	January	Fox -09	January	Cox Tee Dee -15	January	O.S. -49 R/C	January	Z.A. -92	January
Frog 100	June	Nardac R.G. 10	February	E.D. Mk. IV 3.44 Hunter	March	Frog 150	February	D.C. 350 (B)	February	Super Tigre G. 20. S.	November	Oliver Tiger 1.5 cc	July	Webra 1.48	February	Frog 150	February	Albion Sabre	February	D.C. Rapier	June	Alag X-4	February	A.M. -049	February	Cox Tee Dee -09	February	Cox Tee Dee -15	February	E.T.A. -15 Mk II	February	Taifun 1.5 cc	February
Mills Mk. II 1-3	July	E.D. Mk. II	March	Wildcat Mk. III 5 cc	April	Albion Sabre	March	Frog 500	March	Barbini B. 40 T.N.	December	Oliver Tiger 1.5 cc	August	Webra 1.48	March	Frog 150	March	Albion Sabre	March	Spartite Mk. II	July	Rivers Silver Streak	March	A.M. -049	March	Cox Tee Dee -09	March	Cox Tee Dee -15	March	E.T.A. -15 Mk II	March	Jena 2 cc	March
AMCO Mk. 1-87	August	Mills Mk. III	April	Frog 500	May	Albion Sabre	April	Super Tigre G. 20	April	Veco 19	September	Oliver Tiger 1.5 cc	September	Webra 1.48	April	Frog 150	April	Albion Sabre	April	Veco 19	October	Rivers Silver Streak	April	A.M. -049	April	Cox Tee Dee -09	April	Cox Tee Dee -15	April	E.T.A. -15 Mk II	April	Oliver Tiger Major	April
Eta 5 Diesel	September	Weston 3.5 cc	May	Albion Sabre	June	Albion Sabre	May	Super Tigre G. 20	May	Veco 19	October	Oliver Tiger 1.5 cc	October	Webra 1.48	May	Frog 150	May	Albion Sabre	May	Veco 19	November	Rivers Silver Streak	May	A.M. -049	May	Cox Tee Dee -09	May	Cox Tee Dee -15	May	E.T.A. -15 Mk II	May	Oliver Tiger Major	May
Bega Dye 3	October	Elfin 1.8 cc	June	Albion Sabre	July	Albion Sabre	June	Super Tigre G. 20	June	Veco 19	November	Oliver Tiger 1.5 cc	November	Webra 1.48	June	Frog 150	June	Albion Sabre	June	Veco 19	December	Rivers Silver Streak	June	A.M. -049	June	Cox Tee Dee -09	June	Cox Tee Dee -15	June	E.T.A. -15 Mk II	June	Oliver Tiger Major	June
Kaliper 2 cc	November	Elfin 1.8 cc	July	Albion Sabre	August	Albion Sabre	July	Super Tigre G. 20	July	Veco 19	December	Oliver Tiger 1.5 cc	December	Webra 1.48	August	Frog 150	August	Albion Sabre	August	Veco 19	January	Rivers Silver Streak	August	A.M. -049	August	Cox Tee Dee -09	August	Cox Tee Dee -15	August	E.T.A. -15 Mk II	August	Oliver Tiger Major	August
Albion 2-8	December	Elfin 1.8 cc	August	Albion Sabre	September	Albion Sabre	August	Super Tigre G. 20	August	Veco 19	January	Oliver Tiger 1.5 cc	January	Webra 1.48	September	Frog 150	September	Albion Sabre	September	Veco 19	February	Rivers Silver Streak	September	A.M. -049	September	Cox Tee Dee -09	September	Cox Tee Dee -15	September	E.T.A. -15 Mk II	September	Oliver Tiger Major	September
		Elfin 1.8 cc	September	Albion Sabre	October	Albion Sabre	September	Super Tigre G. 20	September	Veco 19	February	Oliver Tiger 1.5 cc	February	Webra 1.48	October	Frog 150	October	Albion Sabre	October	Veco 19	March	Rivers Silver Streak	October	A.M. -049	October	Cox Tee Dee -09	October	Cox Tee Dee -15	October	E.T.A. -15 Mk II	October	Oliver Tiger Major	October
		Elfin 1.8 cc	October	Albion Sabre	November	Albion Sabre	October	Super Tigre G. 20	November	Veco 19	March	Oliver Tiger 1.5 cc	March	Webra 1.48	November	Frog 150	November	Albion Sabre	November	Veco 19	April	Rivers Silver Streak	November	A.M. -049	November	Cox Tee Dee -09	November	Cox Tee Dee -15	November	E.T.A. -15 Mk II	November	Oliver Tiger Major	November
		Elfin 1.8 cc	November	Albion Sabre	December	Albion Sabre	November	Super Tigre G. 20	December	Veco 19	April	Oliver Tiger 1.5 cc	April	Webra 1.48	December	Frog 150	December	Albion Sabre	December	Veco 19	May	Rivers Silver Streak	December	A.M. -049	December	Cox Tee Dee -09	December	Cox Tee Dee -15	December	E.T.A. -15 Mk II	December	Oliver Tiger Major	December
		Elfin 1.8 cc	December	Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	May	Oliver Tiger 1.5 cc	May	Webra 1.48		Frog 150		Albion Sabre		Veco 19	June	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	June	Oliver Tiger 1.5 cc	June	Webra 1.48		Frog 150		Albion Sabre		Veco 19	July	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	July	Oliver Tiger 1.5 cc	July	Webra 1.48		Frog 150		Albion Sabre		Veco 19	August	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	August	Oliver Tiger 1.5 cc	August	Webra 1.48		Frog 150		Albion Sabre		Veco 19	September	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	September	Oliver Tiger 1.5 cc	September	Webra 1.48		Frog 150		Albion Sabre		Veco 19	October	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	October	Oliver Tiger 1.5 cc	October	Webra 1.48		Frog 150		Albion Sabre		Veco 19	November	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	November	Oliver Tiger 1.5 cc	November	Webra 1.48		Frog 150		Albion Sabre		Veco 19	December	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	December	Oliver Tiger 1.5 cc	December	Webra 1.48		Frog 150		Albion Sabre		Veco 19	January	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	January	Oliver Tiger 1.5 cc	January	Webra 1.48		Frog 150		Albion Sabre		Veco 19	February	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	February	Oliver Tiger 1.5 cc	February	Webra 1.48		Frog 150		Albion Sabre		Veco 19	March	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	March	Oliver Tiger 1.5 cc	March	Webra 1.48		Frog 150		Albion Sabre		Veco 19	April	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	April	Oliver Tiger 1.5 cc	April	Webra 1.48		Frog 150		Albion Sabre		Veco 19	May	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	May	Oliver Tiger 1.5 cc	May	Webra 1.48		Frog 150		Albion Sabre		Veco 19	June	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	June	Oliver Tiger 1.5 cc	June	Webra 1.48		Frog 150		Albion Sabre		Veco 19	July	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	July	Oliver Tiger 1.5 cc	July	Webra 1.48		Frog 150		Albion Sabre		Veco 19	August	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	August	Oliver Tiger 1.5 cc	August	Webra 1.48		Frog 150		Albion Sabre		Veco 19	September	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	September	Oliver Tiger 1.5 cc	September	Webra 1.48		Frog 150		Albion Sabre		Veco 19	October	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	October	Oliver Tiger 1.5 cc	October	Webra 1.48		Frog 150		Albion Sabre		Veco 19	November	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	November	Oliver Tiger 1.5 cc	November	Webra 1.48		Frog 150		Albion Sabre		Veco 19	December	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	December	Oliver Tiger 1.5 cc	December	Webra 1.48		Frog 150		Albion Sabre		Veco 19	January	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	January	Oliver Tiger 1.5 cc	January	Webra 1.48		Frog 150		Albion Sabre		Veco 19	February	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	February	Oliver Tiger 1.5 cc	February	Webra 1.48		Frog 150		Albion Sabre		Veco 19	March	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	March	Oliver Tiger 1.5 cc	March	Webra 1.48		Frog 150		Albion Sabre		Veco 19	April	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	April	Oliver Tiger 1.5 cc	April	Webra 1.48		Frog 150		Albion Sabre		Veco 19	May	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	May	Oliver Tiger 1.5 cc	May	Webra 1.48		Frog 150		Albion Sabre		Veco 19	June	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	June	Oliver Tiger 1.5 cc	June	Webra 1.48		Frog 150		Albion Sabre		Veco 19	July	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	July	Oliver Tiger 1.5 cc	July	Webra 1.48		Frog 150		Albion Sabre		Veco 19	August	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	August	Oliver Tiger 1.5 cc	August	Webra 1.48		Frog 150		Albion Sabre		Veco 19	September	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	September	Oliver Tiger 1.5 cc	September	Webra 1.48		Frog 150		Albion Sabre		Veco 19	October	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	October	Oliver Tiger 1.5 cc	October	Webra 1.48		Frog 150		Albion Sabre		Veco 19	November	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	November	Oliver Tiger 1.5 cc	November	Webra 1.48		Frog 150		Albion Sabre		Veco 19	December	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	December	Oliver Tiger 1.5 cc	December	Webra 1.48		Frog 150		Albion Sabre		Veco 19	January	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	January	Oliver Tiger 1.5 cc	January	Webra 1.48		Frog 150		Albion Sabre		Veco 19	February	Rivers Silver Streak		A.M. -049		Cox Tee Dee -09		Cox Tee Dee -15		E.T.A. -15 Mk II		Oliver Tiger Major	
		Elfin 1.8 cc		Albion Sabre		Albion Sabre		Super Tigre G. 20		Veco 19	February	Oliver Tiger 1.5 cc	February	Webra 1.48		Frog 150		Albion Sabre		Veco 19	March	Rivers Silver Streak		A.M. -049									

## OPERATING A FIRST DIESEL (continued)

smart swing of both wrist and arm. At the same time take a firm grip on the compression screw at the cylinder head, and hold this set at the position indicated in the instructions. After a few sharp flicks of the propeller, there should be some reaction in the form of a mild firing stroke - or if you are extraordinarily lucky, the engine may burst into full song straight away.

If the engine refuses to show any inclination to work, look through the exhaust ports and see if the top of the piston is at all wet with fuel. If it is, then use the compression screw as though you have your hand on the pulse of the engine; and raise the compression by screwing in the "vernier" as one maker calls the tommy bar or compression screw. But do not be a "Compression Charlie" for over-compression is dangerous, and is signified by a hydraulic lock when it is impossible to rotate the propeller. This also indicates that our choking has been too generous, the cure being to set the piston at the bottom of its stroke, and to blow hard through the exhausts to clear the excess mixture, and to release compression.

Should the piston be completely dry on inspection through the ports then the choking has not been sufficient, or the needle valve setting is not open enough. It is better to err on the rich or "open" side for first starts—providing you release the compression screw when compression seems too great.

After a while, you get into the swing of things, and soon you are rewarded with a start. Once the engine has begun to run, leave it as set for a few seconds and take stock by watching the exhaust and listening to the note. Smoky, rich exhaust is cured by screwing in the needle valve, and a staccato misfire indicates the need for more compression. Most engines start for the first time in this condition, and will not harm themselves if allowed to run rich. Should the note sound laboured, gradually dying off in r.p.m., then the engine is over-compressed to some degree, and the compression screw must be slackened off.



## Operating Glow Plug Engines

The glow plug form of ignition for an internal combustion engine is one very original principles, used before either diesel or the spark ignition systems. The Wright Bros. used it in their engine to make the first powered flight.

Our glow is provided by a wire element, usually platinum, which becomes incandescent when short circuited in a 1.5 volt (for U.S.A. plugs) or 2.2 volt (British plugs) circuit, and retains incandescence once the engine is firing so that the short circuit can be removed and the engine runs as a self-contained unit.

Plugs vary in construction, even come integral with the cylinder head, and the most common means of fitting the wire element is to have it in a tightly wound coil of about five to seven turns of platinum-iridium wire about .015 in. diameter. Current drain on the booster battery is high, being around 2 to 5 amps, so it is better to remove the battery terminal connection as soon as the engine fires or for any period when the engine is not

actually being flick started. Dry batteries of the large bell-cell type, arranged in parallel are satisfactory, but a wet-cell accumulator is better.

To set the engine ready for starting, mount it securely in a test stand, arrange a fuel supply with the tank on a level with the crankcase, and fit a prop at the "quarter to three" position as on a clockface, securely tightening the prop nut. Now blow through the fuel supply tube with it connected only to the needle valve body, and adjust the needle valve control until a steady hiss is heard at the jet in the centre of the intake.

Next remove the plug, and connect with the battery, one lead to the top of the plug, the other to the plug body. Or earth if the plug is left resting by its body on the engine cylinder head.

Alternatively use one of the special glow clips. There is no need for concern over polarity, just as long as one lead cannot touch the other and that the alligator clips are safely spaced on the plug, then the element should glow bright orange. Dull red will indicate a poor contact, low battery or current leak in the circuit. If the plug glows rapidly to white heat, disconnect immediately as it is most probable that there is too much current going through the element and there is a danger of burning out and fusing unless a resistance is fitted. American plugs on lead acid accumulators are specially susceptible. Once satisfied that the glow is present, we should inject a little of the special fuel through the plug hole, fit the plug and flick over a few times without connecting the plug. A drop of fuel in the intake also helps this way to free up the engine ready for a quick start and the lubrication helps to seal the piston fit.

When thoroughly prepared and ready to start, connect the fuel line to the tank which should be filled, do not choke the carburettor and then hook up the plug immediately prior to flicking over.

Now flick hard: the engine should fire, continue to run sucking fuel through the tube from the tank and giving the impression of running rich. Allow to pick up for five seconds or so disconnect the lead off the top of the glow plug (the other lead can be more or less permanent for test purposes on a mounting lug or other convenient earthing point), then watch the characteristics.

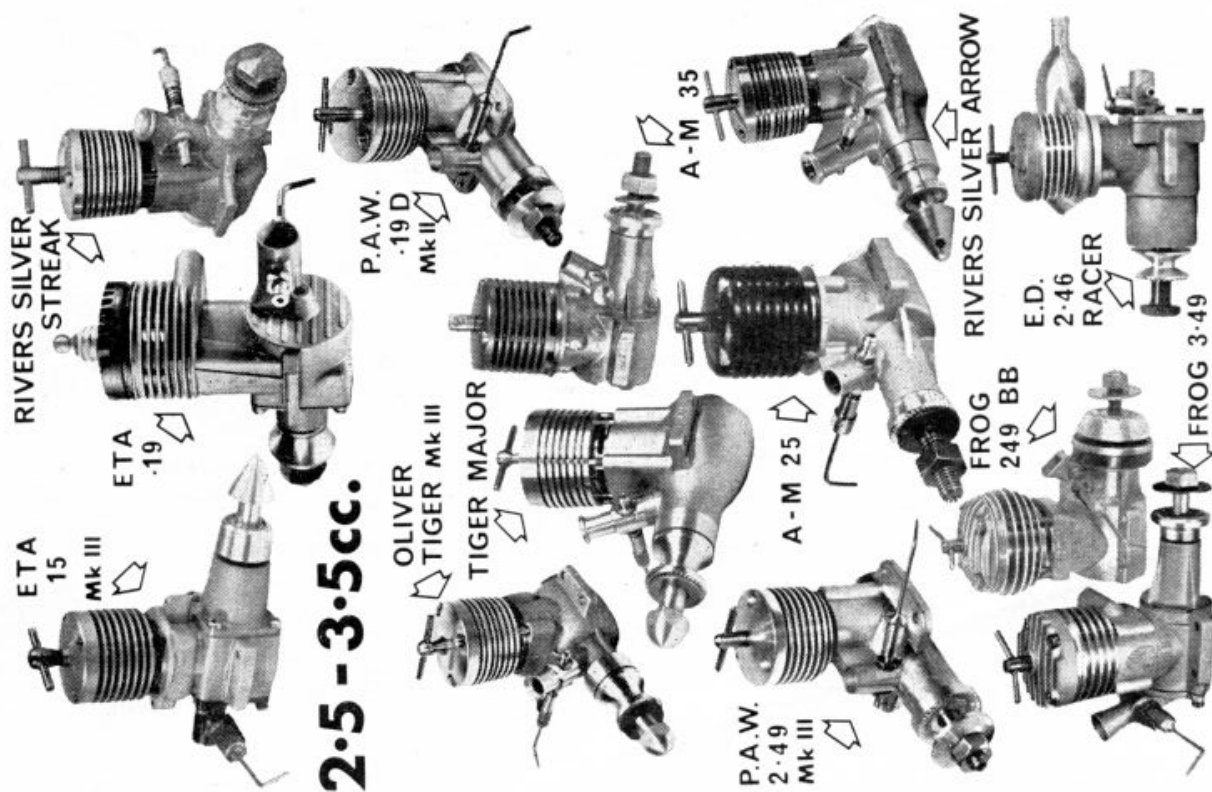
The engine should be rather rich for the first run, not two-stroking but nevertheless operating smoothly with copious fumes from the exhaust and lots of noise. To get the engine to two-stroke, simply lean out the mixture by screwing the needle valve into its body, quarter turn at a time and waiting a moment between adjustments to check the effect in r.p.m. To stop the engine, simply screw the needle valve fully home and the effect will be that the engine speeds up to a peak speed, dies off and stops fairly abruptly through the fuel starvation. This will give the experience needed to identify too lean a fuel setting. If the engine bursts into life and dies out, firing only on a prime given through ports, then obviously it is not getting enough fuel and the needle valve should be opened. If the engine still does not get the fuel through with the needle valve wide open, then there is a blockage in the supply.

If the engine just "plops" each time it is flicked, it needs an upper cylinder prime in most cases (through the exhaust) but there is also the chance that the crankcase is flooded. The engine is then in a very rich state and will not clear until the plug is glowing bright and the engine fires out some of the excess. Shut the needle off, connect the plug to battery and listen with the exhaust port open to the plug sizzle. If silent, look at the wet reflection on the piston crown, and you should see a glow; if none, and no sizzle, then the plug is "out" and should be removed for examination. If it has burned out, a discouraging fact which is signified by a crumpled appearance of the coiled element, then the only answer is replacement. If it appears to be whole then the connections are at fault.



## ... the 'international' class

In production for many years and still firm favourites the **A.M. 25** and **A.M. 35** are easy to start, reliable moderate power output engines for general purpose use. They have also achieved many contest successes, especially for open power duration models. The **A.M. 25** with black cylinder head was the first to be produced and the **A.M. 35** came as a bored development recognisable by its red head. Both are front rotary shaft induction with the air intake cast into the crankcase, and screw-in back plates. Useful r.p.m. range is 10-14,000. Both are for beam mounting on at least in. x in. hardwood bearers spaced 1 in. apart. Now back in production the **E.D. 2.46 Racer** is available in three versions. Standard model is rear rotary disc induction with the air intake cast into the back plate assembly. Shaft is supported in twin ballraces and a hollow bolt is used to retain the propeller. The radio control version is identical with addition of a butterfly throttle. A tuned version with a higher power output is also available. Beam mount on hardwood bearers in. x in. spaced 1 1/8 in. apart. Designed for F.A.I. team racing the **Eta 15 Mk. III** has a twin ballrace supported shaft, rear disc induction and special porting for speed and fuel economy. This is a good starter for the novice or expert and has a specially cast cylinder. Beam mount on in. x in. hardwood bearers (preferably faced with in. steel) spaced 1 1/8 in. apart, or alternatively a cast metal pan. No longer in production the **Eta 19 Mk. II** is a lightweight racing glow motor with rear disc induction and a twin ballrace supported shaft. An unusual feature of this engine was the use of an integrally cast rear air intake with the front housing removable. Peak power is realised at high r.p.m. with small propellers. Beam mount on g in. x in. hardwood bearers spaced at 1 3/16 in. Recognisable by its square front rotary shaft intake and red cylinder with head fins is the **Frog 2.49 BB**. A pace setter in its day, this engine is suited to combat or similar hard work. The twin ballrace supported shaft is set up very free so a plastic seal is used around the front housing to keep out foreign matter. Beam mount onto hardwood bearers in. x in. spaced 1 in. apart. Produced in a radio and standard version the **Frog 3.49 BB** is a rear drum induction, ballrace supported shaft motor with ability to slog at heavy loads without complaint. An unusual feature of this engine is the side stack exhaust port which was one of the first designed to accept a silencer. Firmly beam mount to absorb vibration on hardwood bearers in. x in. spaced 1 1/8 in. apart. A much respected name the world over is that of the Oliver Tiger. It is true to say that over the years they have won more team races and combat finals in their class than all the other makes put together. The Oliver **Tiger Mk. III** is a



twin ballrace supported shaft, front rotary induction contest motor with a screw-in air intake just in front of the cylinder. This engine has both high and low speed capabilities. Latest addition to the range is the **3.5 c.c. Oliver Tiger Major**. Similar to the Tiger in layout this engine provides extra power for combat and peaks at a lower r.p.m. It is also ported for radio control use and for a silencer. Both of these engines are available in several versions these being the /S machined to accept a silencer, the Sport ready silenced and the **R/C** version complete with a barrel throttle and silencer. Mount both engines on in. x g in. hardwood bearers, spaced 1 1/8 in. apart for the Tiger and 1\* for Tiger Major. **P.A.W. 2.49 Mk. II** is also a contest engine and has a single ball race supported shaft with front rotary shaft intake via an air intake cast in the crankcase. Very robust and tough throughout, this engine has been used and progressively modified with success in combat and team racing.

Beam mount on 1/2 in. x 1/2 in. hardwood bearers spaced 1 in. apart. A development of this led to the **P.A.W. 19 D Mk. II** and **19 D BR** being produced to meet a demand for a larger engine. The same layout is used in each but the 19D is plain bearing. Each delivers quite extraordinary power for weight. Beam mount on 1/2 in. x 3/8 in. hardwood bearers spaced 1 in. apart. No longer in production but still to be seen in considerable use are the Rivers engines. Aimed at the contest modeller the **River Silver Streak Mk. II** was unique in having a roller bearing supported shaft. A front rotary shaft valve induction engine with the air intake cast onto the crankcase and tapped shaft for bolt-on propeller fitting, it is tough but had a habit of breaking connecting rods. The 3.5 c.c. **Rivers Silver Arrow** also used the roller race supported crankshaft and was of the same layout with the exception of a general beefing up and extended air intake for combat flying and stunt models. Mount both engines on hardwood bearers at least 1/2 in. x 3/8 in.

## and the 'Big Stuff' up to 10 cc

Only surviving British racing .29 glow engine is the **Eta .29 V1c**. Developed over many marks this engine enjoys the classic racing glow ignition layout originated in the U.S.A. during the late 40's. A twin ball-race supported shaft with an extension collar is used in a detachable front housing. It is of rear disc induction, the air intake being cast onto the removable rear backplate. The large transfer passage and exhaust stack together with its black finned cylinder head are easily distinguishable features. A feature unique to the Eta is the use of a thick asbestos fibre gasket under the cylinder head. Decidedly happier at higher r.p.m., this is mainly a contest modellers' engine for F/F, speed and "B" T/R. Mount on hardwood bearers at least 1/2 in. x 1/2 in. spaced 1 1/4 in. apart. Out of production for some months but a leader in its time the **Frog 500 RG** has a closely finned cylinder head, and light crankcase with a bolt-on metal fuel tank and long exhaust stack. Employing front rotary induction via an air intake cast into the crankcase, it originated as a coil/spark ignition engine. Beam or radial mount, on 1/2 in. x 1/2 in. hardwood bearers spaced 1 1/4 in. apart.

The Merco range of large capacity engines started with the **Merco 29** and **Merco 35** using similar components. Front rotary shaft induction with the shaft supported in a plain bearing and a one piece crankcase incorporating the air intake, these engines are robust and suitable for all forms of aeromodelling, the 35 being the standard British choice for control line stunt flying for several years. Radio control "Multispeed" versions of both engines are available using a rotating barrel carb: with air bleed adjustment and a linked exhaust chopper. Beam mount on 1/2 in. x 1/2 in. hardwood bearers spaced 1 1/4 in. apart. The **Merco 49** and **61** also use the same crank case, the 61 having a bored out liner. Construction is more complex than the smaller sizes with the shaft supported in twin ballraces and front rotary shaft induction air intake cast into the crankcase which only extends as far up as the top of the transfer passage. The liner has a light alloy cooling fin jacket and a finned cylinder head. The piston has two rings and extra ports cut in the side to match those in the liner to aid gas transfer. Standard version is available of the 49 for C/L stunt. The 61 is for radio control only and uses the same carb/chopper as the 49. The carb: is a progressive barrel type with air bleed adjustment via a small screw and is linked to a centrally pivoted exhaust chopper which is removed when a silencer is fitted. Mount the same as the 29 and 35 but space the hardwood bearers 1 1/2 in. apart. Although many twin cylinder engines have been produced in the U.S.A., Germany and in Great Britain, the Taplin is the only one to have proved continually popular and to have

retained a fairly low price level. Current model is the **Taplin Twin Mk. II** of 8 c.c. capacity, an inline alternate firing twin with built up shaft supported in front by one roller race and by one ballrace at the rear. Induction is side port via a single screw-in adjustable throttle that offers remarkable speed range control. Exhaust is collected in a common manifold. With symmetrical timing the engine runs usefully in either direction. Heavy at 17 1/2 oz. it comes into its own on large (14 in. dia.) propellers and peaks on an 11 x 4. Reliability and very low idle speed are two of its virtues for large sport models. Beam mounting only on in. 1/2 x 1/2 in. hardwood bearers spaced 1 1/4 in. apart.

## 5-10cc.

